

REMARKS

Applicants received and reviewed the Office Action sent on November 9, 2010. Claims 1-3, and claims 5-49 are currently pending. Claims 35-49 were previously withdrawn from consideration in response to the restriction requirement. Claim 4 was previously canceled. In this Amendment, Applicants amended claim 1 above to recite a coating which consists essentially of magnesium powder and a binder. Applicants also amended claims 10, 11 and 17 to recite that the magnesium particle powder has a mean particle size distribution in μm , as described on pages 13-14 of the Specification, and not in mm as previously recited. Applicants also amended the title of the application as requested by the Examiner on page 6 of the Office Action. Applicants have corrected the form of the amendment to the title according to 37 CFR 1.121(b)(1)(ii) showing the deleted title with strikethrough text and the new title with underlined text. No new matter has been added by these amendments. Applicants respectfully request reconsideration of this application in light of the following remarks.

A. Allowable Subject Matter

Applicants thank the Examiner for the indication of allowable subject matter in this application. Specifically the Examiner has indicated that claims 21-29 are allowable but are currently objected to as being dependent upon a rejected base claim.

B. Telephone Interview

Applicants acknowledge and thank Examiner Fletcher for his courtesy and consideration during the telephone interview conducted between Applicants' representative and Examiner Fletcher on 17 February 2011. During the interview, Applicants' representative and Examiner Fletcher discussed possible amendments to the claims.

C. Status of Restriction Requirement

In the November 9, 2010 Office Action, the Examiner made the August 31, 2010 restriction requirement final. Applicants affirm their election of Group I, claims 1-34, for examination in this application.

D. Status of Information Disclosure Statement

Applicants acknowledge and appreciate the Examiner's indication that the Information Disclosure Statement filed on 14 February 2007 was considered.

E. Status of Drawings

Applicants acknowledge and appreciate the Examiner's indication that the drawings filed on 12 May 2006 are acceptable.

F. Specification

In the November 9, 2010 Office Action, the Examiner objected to the title of the invention as not descriptive. As shown in the above amendments, Applicants amended the title of the application to clearly indicate the invention to which the claims are directed. Applicants amended the title to adopt the Examiner's suggestion of "METHOD OF APPLYING A MAGNESIUM-CONTAINING POWDER TO THE SURFACE OF AN ALUMINUM OR ALUMINUM ALLOY SUBSTRATE." As such, Applicants respectfully request withdrawal of the objection to the title.

G. Rejections under 35 U.S.C. § 112, second paragraph

The Examiner rejected claims 11 and 15 under 35 U.S.C. § 112, second paragraph as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Examiner considers the limitation "from about 70 microns" to be indefinite as no upper limit is specified, and it fails to further limit the range of 65-75 microns in the claims from which claims 11 and 15 each depend. Applicants amended claims 11 and 15 to recite that "the first magnesium particle powder has a mean particle size distribution of about 30 µm and wherein the second magnesium particle powder has a mean particle size distribution of about 70 µm." This embodiment of the invention is disclosed on page 14 of the Specification. Claim 10 had a similar error and was also amended as shown in the listing of claims. Applicants respectfully request that this rejection be withdrawn.

H. Claim Rejections under 35 U.S.C. § 103(a) using the Combination of the Wurbs Patent or the Parson Patent and the Gros Application

Claims 1-3, 5-8, and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Wurbs et al. in U.S. Patent Number 2,933,400 ("the Wurbs patent") or Parson et al. in U.S. Patent

Number 4,083,726 ("the Parsons patent") in view of Gros U.S. Patent Application Publication Number 2005/0161641 ("the Gros application"). In view of the amendments above and the comments below, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1-3, 5-8, and 17 under 35 U.S.C. § 103(a).

The claimed invention is generally directed to a composition and method for preventing or inhibiting corrosion of metals, particularly aluminum and aluminum alloys. For example, amended independent claim 1 recites a method of treating an aluminum or an aluminum alloy metal to improve the metal's corrosion resistance. The method recited in claim 1 includes applying a coating to the surface of the metal, where the coating consists essentially of magnesium powder and a binder. In contrast, none of the cited references discloses or suggests a coating composition that contains the magnesium powder and a binder along with other ingredients that do not affect the basic and novel characteristics of the claim.

The high activity of magnesium used in the methods of the claimed invention, when compared to the activities of most other metals, permits the method of the present invention to be used on substrates made of two or more components of different metals in contact with one another (e.g., an aluminum component in contact with a steel component) without the risk of improving the corrosion resistance of one component while promoting corrosion of another component. See paragraph [0023] of the pending application. In addition, the method of the claimed invention is carried out by using a coating which includes the magnesium powder and a binder. The coating can include one or more other materials, such as other metal particles, solvents, and the like. See paragraph [0033].

The components in the coatings of the cited references were employed in view of the iron or steel surface to be coated in contrast to the aluminum/aluminum alloy coated in the claimed method. Additionally, the coatings of the cited references employ a mixture that is predominantly iron but which may use magnesium for its chemical reactivity within the chemical system of the anti-rust agent/paint. To wit, in the Wurbs patent, magnesium is substituted with another polyvalent metal, such as zinc or lead, for example. See col. 1, lines 59-62 and Examples 2 and 3 of the Wurbs patent.

Further, the Wurbs patent describes an anti-rust agent or paint for iron surfaces that has the following four components: a conventional binder; powdered metals which were powdered iron and a second metal of magnesium, lead, or zinc; and powdered active carbon. This anti-rust agent/paint is designed to protect against rust by its reacting with oxygen instead of the metal surface it is protecting. See, e.g., col. 2, lines 5-14. A person skilled in the art would understand that each component of anti-

rust agent/paint is necessary for the chemical reaction/protection the anti-rust agent/paint provides. Nothing in the Wurbs patent discloses or suggests that powdered magnesium could be used as a corrosion inhibitor on aluminum or an aluminum alloy surface. The powdered magnesium if used in the Wurbs patent is used for its chemical reactivity within the chemical system of the anti-rust agent/paint.

The Parson patent also fails to appreciate, much less disclose or suggest, a largely magnesium coating used to coat aluminum or an aluminum alloy substrate. The Parson patent describes a coating to protect steel from corrosion. That coating is a mixture of an organic solvent, a binder, powdered magnesium and a passivating agent which has a pH greater than about 8 and less than about 13. The coating is used in the pre-construction protection of steel and applied as a primer to freshly blasted steel plates prior to cutting or welding. The teaching of the Parson patent is directed to the substitution of magnesium powder for the zinc powder traditionally used in to protect pre-construction steel plates. The Parson patent discloses that this is not a simple substitution of one powdered metal for another, "the substitution of powdered magnesium for powdered zinc is not a simple matter." Col. 1, line 65, et seq. The Parson patent uses the passivating agent to adjust the properties of the coating so that magnesium in a coating to protect steel plates. Additionally, the Parson patent notes and refers to the "magnesium-rich protective coatings" of U.S. Pat. No. 2,933,400 (Wurbs et al.) to prevent rusting and how those coatings are "not satisfactory as a preconstruction primer." Col. 2, lines 7-14. Like the Wurbs patent, the Parson patent teaches a particular coating composition for a particular use on steel. The Parson patent does not teach or suggest the use of its coating for any other metal substrate or other use with steel, the metal substrate of concern to the Parson patent. In fact, the Parson patent explicitly teaches that other arguably similar coatings, those of the Wurbs patent, could not be used for a different use. From the teachings of the Parson patent, a person skilled in the art would not have expected that the coating of the Parson patent (or of the Wurbs patent) could be used on aluminum or an aluminum alloy to prevent corrosion.

As the Examiner concedes, neither the Wurbs patent nor the Parson patent teaches that the metal substrates are the claimed aluminum or aluminum alloys. The Examiner then relies upon the Gros application to supplement the Wurbs patent or the Parson patent. However, there is no rational basis for combining the teachings of the Wurbs patent or the Parson patent with the Gros application. One of ordinary skill in the art would not have modified the composition of either the Wurbs patent or the Parson patent to be predominantly magnesium powder and a binder and then expect the modified composition to work on the aluminum or aluminum alloy of the Gros application.

In the Gros application, the mixture used to coat the metallic substrate is a welding primer that includes many elements. See paragraph [0015] of the Gros application. However, the Gros application does not disclose or suggest a coating that consists essentially of magnesium powder and a binder. In all of the coatings described in the Gros application, the coating includes multiple compounds or mixtures of compounds along with various binders, crosslinking agents, post-crosslinking compounds, additives, corrosion protection pigments, and corrosion inhibitors. See paragraph [0015] of the Gros application. In no case does Gros rely predominantly on magnesium powder and a binder with which to treat an aluminum or an aluminum alloy metal to improve the metal's corrosion resistance as recited in amended claim 1 of the pending application. In fact, as shown below, the Gros application recites a litany of particles that could be used in the mixture.

[0029] In the mixture according to the invention, the electrically conductive or/and semiconducting particles a) can comprise substances based on compounds or mixtures of compounds with or of spinels, such as e.g. Fe₂O₃, Mn₂O₃, FeMn₂O₄ or/and further substances based on borides, carbides, oxides, phosphates, phosphides, silicates, silicides or particles having an electrically conductive coating or/and a mixture thereof or a common compound thereof, and optionally further metallic particles, including alloys or/and carbon black, chosen from aluminium, iron, cobalt, copper, molybdenum, nickel, niobium, silver, tantalum, titanium, vanadium, tungsten, zinc, tin, aluminium-, iron-, cobalt-, copper-, molybdenum-, nickel-, niobium-, silver-, tantalum-, titanium-, vanadium-, tungsten-, zinc- or/and tin-containing alloys, in particular oxides substantially based on spinels, preferably of aluminium, chromium, iron, cobalt, copper, magnesium, manganese, nickel, vanadium, titanium or/and zinc or/and substantially based on electrically conductive or/and semiconducting oxides having a below-stoichiometric oxygen content, such as e.g. TiO₂, or/and in particular phosphides substantially based on aluminium, iron, cobalt, copper, manganese, molybdenum, nickel, niobium, tantalum, titanium, vanadium, tungsten, zinc or/and tin, in particular based on phosphides, preferably based on iron-, manganese-, nickel- or/and tin-containing phosphides. Particles having an electrically conductive coating which are suitable in particular are those which have an electrical conductivity at least of metallic zinc, in particular particles coated with graphite, carbon black, another type of carbon, electrically conductive metal, iron oxide, antimony compound(s) or/and tin compound(s).

The multiple and varied components used in all of the examples in the Gros application make it unlikely that a person of skill in the art would modify the mixture of either the Wurbs patent or the

Parson patent to substitute one of the many, many elements disclosed in the Gros application in order to arrive at the claimed invention. There is simply no rational basis to select a magnesium needle from the haystack of all possible particles outlined in the Gros application and then to perform a wholesale substitution into the disclosures of the Wurbs patent or the Parson patent to try to arrive at the claimed invention of the pending application. Any such selection and substitution would require undue experimentation at best and a lifetime of failed substitutions at worst. Success would be unlikely. The wide range of possible outcomes and the relative unlikelihood that the resulting compound would exhibit the properties of the claimed invention would not make it obvious for one of skill in the art to substitute and then combine the claimed elements. Indeed, the unpredictable properties of the claimed composition and method of preparing it are directly contrary to that position. Nothing in the cited combination of references or in the state of the art suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance. Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

Claims 2-3, 5-8 and 17 ultimately depend upon independent claim 1, and thereby include all the limitations of independent claim 1 while reciting additional features of the present invention. Applicants respectfully oppose the rejection of claims 2-3, 5-8 and 17 for similar reasons as outlined above with regard to the rejection of claim 1 under 35 U.S.C. § 103(a). As discussed above, nothing in the cited combination of references or in the state of the art discloses or suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance.

Additionally, with regard to claims 2 and 3, while both the Wurbs patent and the Parson patent do not expressly mention that their coatings include chromium, the Gros application provides chromium as a possible metallic particle that can be used in the mixture of the Gros application. See paragraphs [0029 and 0030] of the Gros application or the reproduction of paragraph [0029] above. This same section of the Gros application cannot be read to include magnesium and leave out chromium. This would be contrary to the disclosure of the Gros application. With respect, Applicants submit that the Wurbs and Parson patents are at odds with the Gros application with regard to the addition of chromium to the coating mixture. As such, the combination of these references does not disclose or suggest that the coating does not include chromium. Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

With regard to claims 5-8, these claims recite that the metal to be coated is an aluminum alloy in a variety of compositions including is Al 2024 T-3 and Al 7075 T-6. There cited combination of references fails to disclose or suggest that an aluminum alloy to be coated would include the compositions recited in claims 6-8 of the pending application. Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

I. Claim Rejections under 35 U.S.C. § 103(a) using the Combination of the McKaveney Patent and the Gros Application

Claims 1-3, 5-8, 17, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over McKaveney et al. US 4,360,384 (“the McKaveney patent”) in view of Gros WO 2003/089529—reference made to US 2005/0161641 A 1 as the English-language equivalent (“the Gros application”). Applicants discussed the Gros application above with regard to the Wurbs patent and the Parson patent.

As outlined above, the components in the coatings of the cited references were employed in view of the iron or steel surface to be coated in contrast to the aluminum/aluminum alloy coated in the claimed method. In the McKaveney patent, a coating composition is designed to be substitute for traditional zinc coating compositions.

The McKaveney et al. discloses a coating composition to protect metal surfaces from corrosion. The McKaveney patent coating composition comprises a binder and a filler of conductive metal particles and particles of a metal composition of comprising silicon and a highly active metal–silicon alloys and silicides. The “highly active metal” is selected from the group consisting of manganese and metals above manganese on the electromotive series and mixtures thereof. The coating compositions are used to protect “substrates of ferrous metal, copper and the like.” The alloy or silicide is necessary for the protection of these surfaces. Col. 6, lines 33-48. Like the Parson patent, the McKaveney patent is seeking to provide substitute coating compositions for the traditional zinc coating compositions. Here again is a particular coating composition for use on a particular substrate. Nothing in the McKaveney patent teaches or suggests the use of its coating composition on aluminum or an aluminum alloy and much less whether or not the key silicon alloy/silicide component could be used on aluminum or an aluminum alloy. Given the care in which the McKaveney patent (and the other cited art) designs their coatings for a particular substrate and use with that substrate, a person skilled in the art would not have found the claimed invention obvious. Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

J. Claim Rejections under 35 U.S.C. § 103(a) using the Combination of the Parson Patent and the Gros Application or the Wurbs and McKaveney Patents in view of the Parson Patent and the Gros Application

Claims 9-16 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Parson alone in view of Gros or, in the alternative, Wurbs or McKaveney et al. in view of both Parson and Gros. Claims 9-16 ultimately depend upon independent claim 1, and thereby include all the limitations of independent claim 1 while reciting additional features of the present invention. Applicants respectfully oppose the rejection of claims 9-16 for similar reasons as outlined above with regard to the rejection of claim 1 under 35 U.S.C. § 103(a). As discussed above, nothing in the cited combination of references or in the state of the art discloses or suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance.

As discussed above, the multiple and varied components used in all of the examples in the Gros application make it unlikely that a person of skill in the art would modify the mixture of either the Wurbs patent or the Parson patent or the McKaveney patent to substitute one of the many, many elements disclosed in the Gros application in order to arrive at the claimed invention. It is even further removed that a person of ordinary skill in the art would then vary the size and distribution ratios of the substituted element to arrive at the specific sizes and distribution ratios recited in claims 9-16 of the pending application.

As before, any such selection and substitution would require an extraordinary amount of experimentation, and success would be unlikely. The wide range of possible outcomes and the relative unlikelihood that the resulting compound would exhibit the properties of the claimed invention would not make it obvious for one of skill in the art to substitute and then combine the claimed elements using the sizes and distribution ratios recited in pending claims 9-16. Nothing in the cited combination of references or in the state of the art suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance, especially using the particle sizes and distribution ratios recited in claims 9-16. As such, Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

K. Claim Rejection under 35 U.S.C. § 103(a) using the Combination of the Wurbs Patent, Parson Patent, or McKaveney, each in view of the Gros Application and in further view of the Mansfeld Patent

Claim 32 stands rejected under 35 U.S.C. 103(a) as being unpatentable over Wurbs, Parson, or McKaveney, each in view of Gros, additionally in view of Mansfeld et al. U.S. Patent No. 6,632294 ("the Mansfeld patent").

Claim 32 depends upon independent claim 1, and thereby includes all the limitations of independent claim 1 while reciting additional features of the present invention. Applicants respectfully oppose the rejection of claim 32 for similar reasons as outlined above with regard to the rejection of claim 1 under 35 U.S.C. § 103(a). As discussed above, nothing in the cited combination of references or in the state of the art discloses or suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance.

Further, the Mansfeld patent fails to cure the deficiencies of the combinations of references discussed above. The Mansfeld patent discusses corrosion protection of steel in ammonia/water heat pumps by substitution rare earth metal salts for chromates as chemical inhibitors in the pumps. See col. 2, lines 16-21 of the Mansfeld patent. There is no disclosure or suggestion of using a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve corrosion resistance. The Mansfeld patent instead focuses on using a cerium oxide/hydroxide layer to pre-treat the steel surface of a pump. As such, Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

L. Claim Rejection under 35 U.S.C. § 103(a) using the Combination of the Wurbs Patent, Parson Patent, or McKaveney Patent, each in view of the Gros Application.

Claims 33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wurbs, Parson, or McKaveney, each in view of Gros.

Claims 33 and 34 each depend upon independent claim 1, and thereby includes all the limitations of independent claim 1 while reciting additional features of the present invention. Applicants respectfully oppose the rejection of claims 33 and 34 for similar reasons as outlined above with regard to the rejection of claim 1 under 35 U.S.C. § 103(a). As discussed above, nothing in the cited combination of references or in the state of the art discloses or suggests the use of a magnesium

powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance.

Additionally with regard to claim 34, as discussed above, the multiple and varied components used in all of the examples in the Gros application make it unlikely that a person of skill in the art would modify the mixture of either the Wurbs patent or the Parson patent or the McKaveney patent to substitute one of the many, many elements disclosed in the Gros application in order to arrive at the claimed invention. It is even further removed that a person of ordinary skill in the art would then vary the form of the substituted element to arrive at the magnesium flake form recited in claim 34 of the pending application.

As before, any such selection and substitution would require an extraordinary amount of experimentation, and success would be unlikely. The wide range of possible outcomes and the relative unlikelihood that the resulting compound would exhibit the properties of the claimed invention would not make it obvious for one of skill in the art to substitute and then combine the claimed elements using the magnesium flake recited in pending claim 34. Nothing in the cited combination of references or in the state of the art suggests the use of a magnesium powder and a binder as a coating to be applied to an aluminum or aluminum alloy metal to improve the metal's corrosion resistance, especially using the form recited in claim 34. As such, Applicants respectfully request that the Examiner reconsider and withdraw the § 103 rejection of these claims.

M. Double Patenting

Claims 1-3, 5-8, and 17-20 stand provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-5, 15-19, 20, 23, 25, 51, and 63-66 of co-pending application serial number 11/992,112. Applicants respectfully request that the Examiner hold the rejection of these claims under obviousness-type double patenting in abeyance until the prior art rejections are fully addressed. If obviousness-type double patenting issues remain at that time, Applicants will consider timely filing a terminal disclaimer in compliance with 37 C.F.R. § 1.321(c) or § 1.321(d) to overcome the non-statutory double patenting grounds.

N. Conclusion

Applicants respectfully request reconsideration of this application in view of the above amendments and remarks. If the Examiner believes a telephone conference could be useful in resolving any outstanding issues, the Examiner is respectfully invited to contact Applicants' undersigned counsel at (703) 776-9705.

Respectfully submitted,

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